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Title of the Invention

Simple filtration device

Summary

Purpose

The invention proposes a small-sized and easy-to-handle simple filtration device using tube(s).

Constitution

Simple filtration device consisting of one or two or three longitudinal porous ceramic tube(s) incorporating a base and suspended from overhead 9 wherein molten metal 13 flows inside from above and is filtered by passing from the inside to outside, filtration chamber 3 with heater arranged to store said molten metal filtered by said tube 9, and extraction tube 15 of extraction pump 17 inserted inside said filtration chamber 3.

Flange 10 is integrally formed on the upper edge of said tube 9, said flange 10 being installed through being fixed from above to lie flush with where inclined surface 8 of central lid 4, whose upper surface forms said inclined surface 8, is lowest.

2. Claims

Claim 1. Simple filtration device consisting of one or two or three longitudinal porous ceramic tube(s) incorporating a base and suspended from overhead 9 wherein molten metal 13 flows inside from above and is filtered by passing from the inside to outside, filtration chamber 3 with heater arranged to store said molten metal filtered by said tube 9, and extraction tube 15 of extraction pump 17 inserted inside said filtration chamber 3.

Claim 2. Simple filtration device consisting of one or two or three longitudinal porous ceramic tube(s) incorporating a base and suspended from overhead 9 wherein molten metal 13 flows inside from above and is filtered by passing from the inside to outside, filtration chamber 3 with heater arranged to store said molten metal filtered by said tube 9, air supply tube 18 of air pressure fan 16 inserted inside said filtration chamber 3, and molten metal extraction tube 19 extracting molten metal by the pressure of the air supplied by said air pressure fan 16

Claim 3. Simple filtration device as claimed in claim 1 or 2 wherein flange 10 is integrally formed on the upper edge of said tube 9, said flange 10 being installed through being fixed from above to lie flush with where inclined surface 8 of central lid 4, whose upper surface forms said inclined surface 8, is lowest.

Detailed Explanation of the Invention

[0001]

Industrial Application Field

This invention relates to a simple filtration device.

[0002]

Prior Art

The specification of previous Japanese Patent Application H2-339690 proposes a filtration device wherein rod-like heater b is provided in the four corners inside dross removal chamber a, stirrer d rotated by motor c is provided at the centre, dross is arranged to float to the surface through the molten metal being heated and stirred, and the molten metal whose dross is removed is filtered by plate-like filtration body e (see Fig. 1). The device shown in Fig. 1 is a simple and moreover low-cost filtration device used for filtration of small amounts of aluminium of at most around 50~100 kg, being arranged for filtration by plate-like filtration body e in such a way that any excessively large amounts of molten metal cannot be filtered. f is a refractory wall surface comprising the circumference, g is a refractory lid, h is a communication path

extending from dross removal chamber a to plate-like filtration body e, and i is a molten metal outlet. Previously published Japanese Patent Application S63-90564, as shown in Fig. 2, further proposes a device wherein filtration unit k provided with transverse ceramic tubes j between longitudinal panel n on the molten metal outlet side and longitudinal panel o on the opposite side is provided inside filtration tank a. Molten metal is arranged to be filtered by passing from the outside to inside of said tubes j. The molten metal filtered in said tubes j passes along communication path h and is filtered by plate-like filtration body e. In Fig. 2, m is a heater installed in refractory lid g. Fig. 3 shows a simple filtration device wherein two plate-like filtration bodies are transversely arranged alongside each other in simplest filtration chamber a without any filtration unit k shown in Fig. 2, ie dross removal chamber a as shown in Fig. 1.

[0003]

#### Problems to be Solved by the Invention

The simple filtration device shown in Fig. 1 and the simple filtration device shown in Fig. 2 both only eventually perform filtration in one plate-like filtration body e, their own filtration capacity being determined by the filtration capacity of this one plate-like filtration body e, and cannot filter any more than at most around 50~100 kg. This represents their full capacity during aluminium die-casting processes used in the manufacture of automotive components, and the devices concerned have therefore not become very widespread. Even in these cases, outstanding problems are that filtration is highly time-consuming and that plate-like filtration body e is prone to clogging in a way that makes frequent replacement necessary. To prevent clogging, efforts have been made to develop the vibrating type of plate-like filtration body. In this context, the device shown in Fig. 3 incorporates two plate-like filtration bodies and therefore has twice the capacity of those shown in Figs. 1 and 2. Application of two plate-like filtration bodies, however, means that the filtration tank is twice as big.

[0004]

#### Means of Solving the Problems

This invention accordingly proposes a small-sized and easy-to-handle simple filtration device that maintains a satisfactory filtration area by use of tube(s) in place of plate-like filtration body e, the proposed device being a simple filtration device consisting of one or two or three longitudinal porous ceramic tube(s) incorporating a base and suspended from overhead 9 wherein molten metal 13 flows inside from above and is filtered by passing from the inside to outside, filtration chamber 3 with heater arranged to store said molten metal filtered by said tube 9, and extraction tube 15 of extraction pump 17 inserted inside said filtration chamber 3. This invention further proposes a simple filtration device consisting of one or two or three longitudinal porous ceramic tube(s) incorporating a base and suspended from overhead 9 wherein molten metal 13 flows inside from above and is filtered by passing from the inside to outside, filtration chamber 3 with heater arranged to store said molten metal filtered by said tube 9, air supply tube 18 of air pressure fan 16 inserted inside said filtration chamber 3, and molten metal extraction tube 19 extracting molten metal by the pressure of the air supplied by said air pressure fan 16. This invention further proposes a simple filtration device wherein flange 10 is integrally formed on the upper edge of said tube 9, said flange 10 being installed through being fixed from above to lie flush with where inclined surface 8 of central lid 4, whose upper surface forms said inclined surface 8, is lowest.

[0005]

Explanation of Constitutions of Embodiment Examples

The constitutions of embodiment examples of this invention are explained below with reference to the attached drawings. Fig. 4 shows a first embodiment example. 1 is a filtration tank. The circumference is formed in the shape of a tube by refractory wall 2. Filtration chamber 3 is formed inside. The upper surface of filtration chamber 3 is tightly sealed by central lid 4, and lid 5 is placed on the upper surface of said central lid 4.

[0006]

Said central lid 4 is fixed in position by being lowered from above on top of step 6 formed on the inside on the upper surface of refractory wall 2 of filtration tank 1. Vertical through-opening 7 is formed in the intermediate position, and the upper surface of central lid 4 is formed by inclined surface 8 in such a way that the position of said through-opening 7 is lowest. Cylindrical porous ceramic tube 9 incorporating a base is suspended from overhead through being inserted from above in said through-opening 7. The upper edge of said tube 9 is formed by large-diameter flange 10. Said flange 10 is fixed in stepped hole 11 on top of said through-opening 7. The upper edge of said flange 10 is arranged so that it does not project beyond inclined surface 8 of said central lid 4.

[0007]

12 is a molten metal inlet tube. Molten metal 13 admitted from said molten metal inlet tube 12 flows over inclined surface 8 and into porous ceramic tube 9, is filtered by passing from the inside to outside, and collects inside filtration chamber 3. When ambient air aspirated through air extraction tube 14 is supplied to filtration chamber 3 from air supply tube 18 of air pressure fan 16, molten metal is supplied from molten metal outlet tube 19 by the air pressure generated.

[0008]

Fig. 5 shows a second embodiment example. In this example, air extraction tube 14, air pressure fan 16, and air supply tube 18 as available in embodiment example 1 (Fig. 4) are not provided. The device shown is installed through extraction tube 15 of extraction pump 17 being inserted inside filtration chamber 3.

[0009]

Explanation of functions

The functions are described below.

Function of device in Fig. 4

Filtration chamber 3 closed by central lid 4 is almost fully tightly sealed. When molten metal 13 such as aluminium, etc is supplied from molten metal inlet 12 to filtration chamber 3, molten metal 13 flows over inclined surface 8 on the upper surface of central lid 4 due to its inclination and flows into porous ceramic tube incorporating a base and suspended from overhead 9. When molten metal 13 passes from the inside to outside of porous ceramic tube 9, it is filtered and stored inside filtration chamber 3. When this occurs, the filtration body, being a tube, and not a plate as in the conventional case, has an extensive filtration area with good capacity and little clogging. A heater is further installed in filtration chamber 3 to allow heating of molten metal 13 and its maintenance at high temperature. When air pressure fan 16 is operated and air supplied from air supply tube 18, the air pressure inside airtight filtration chamber 3 rises, and molten metal can be extracted from molten metal outlet tube 19.

[0010]

Function of device in Fig. 5

Central lid 4 is finished to a rough state in such a way that air can enter. Filtration chamber 3 is therefore not airtight. When molten metal 13 such as aluminium, etc is supplied from molten metal inlet 12 to filtration chamber 3, molten metal 13 flows over inclined surface 8 on the upper surface of central lid 4 due to its inclination and flows into porous ceramic tube incorporating a base and suspended from overhead 9, as shown in Fig. 4. When molten metal 13 passes from the inside to outside of porous ceramic tube 9, it is filtered and stored inside filtration chamber 3. As shown in Fig. 4, the filtration body, being a tube, and not a plate as in the conventional case, has an extensive filtration area with good capacity and little clogging. After filtration, the molten metal is then simply extracted through operation of extraction pump 17.

[0011]

Effect of the Invention

This invention proposes a simple filtration device consisting of one or two or three longitudinal porous ceramic tube(s) incorporating a base and suspended from overhead 9 wherein molten metal 13 flows inside from above and is filtered by passing from the inside to outside, filtration chamber 3 with heater arranged to store said molten metal filtered by said tube 9, and extraction tube 15 of extraction pump 17 inserted inside said filtration chamber 3. Filtration chamber 3 can therefore be reduced in size, and the device provided has an extensive filtration area and little clogging. When extraction pump 17 is operated, the device provides simple extraction in an optimum way suitable for filtration of small amounts of molten metal 13. This invention further proposes a simple filtration device consisting of one or two or three longitudinal porous ceramic tube(s) incorporating a base and suspended from overhead 9 wherein molten metal 13 flows inside from above and is filtered by passing from the inside to outside, filtration chamber 3 with heater arranged to store said molten metal filtered by said tube 9, air supply tube 18 of air pressure fan 16 inserted inside said filtration chamber 3, and molten metal extraction tube 19 extracting molten metal by the pressure of the air supplied by said air pressure fan 16. The device provided therefore not only performs the functions described above, but molten metal 13 is also extracted from molten metal extraction tube 19 simply through the air pressure generated by air pressure fan 16. This invention further proposes a simple filtration device wherein flange 10 is integrally formed on the upper edge of said tube 9, said flange 10 being installed through being fixed from above to lie flush with where inclined surface 8 of central lid 4, whose upper surface forms said inclined surface 8, is lowest. It is therefore also extremely easy to install porous ceramic tube 9.

Simple Explanation of the Drawings

Fig. 1: Longitudinal-section elevation drawing of a first known example.

Fig. 2: Longitudinal-section elevation drawing of a second known example.

Fig. 3: Longitudinal-section elevation drawing of a third known example.

Fig. 4: Longitudinal-section elevation drawing of a first embodiment example.

Fig. 5: Longitudinal-section elevation drawing of a second embodiment example.

Fig. 6: Plan drawing of central lid.

Fig. 7: Longitudinal-section drawing of central lid.

Fig. 8: Partially cut-away elevation drawing of tube.

Fig. 9: Base plan drawing of tube.

Explanation of the Symbols

1 ... filtration tank, 2 ... refractory wall, 3 ... filtration chamber, 4 ... central lid, 5 ... lid, 6 ... step, 7 ... vertical through-opening, 8 ... inclined surface, 9 ... porous ce-

ramic tube, 10 ... flange, 11 ... stepped hole, 12 ... molten metal inlet tube, 13 ... molten metal, 14... air extraction tube, 15 ... extraction tube, 16 ... air pressure fan, 17 ... extraction pump, 18 ... air supply tube, 19 ... molten metal outlet tube

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8